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FIRST NOTIONS OF GEOLOGY.

A MOTHER'S TALK.

By Mrs. T. S. Cole.

Come, children, to-day we will leave our smoky town in the valley, and we will drive away up the long slopes which lie between us and Derbyshire. You see the gentle incline of the hill for the first four or five miles, and then a sudden and abrupt break—a crag, rough and jagged—big broken blocks strewn on the slope beneath. How was it made? Then, standing on the top of this "edge," as we call them here, look over the wide view before you. Do you see that hill standing up in front of us with gentle slopes at the bottom, and a kind of cap of broken crags on top. Who put the cap on? Why are the first slopes gentle, and then the last bit is steep and rugged, and hard to climb? Away to our left you can see one of these rugged "edges," which has been quarried away. It is called "Millstone Edge," and all along the slopes below it, lie heaps and heaps of millstones—big and little—old and new—some quite old, lying almost buried among the bracken and bilberry And you soon guess that the edge received its name because millstones were made from it. Now, had it not been for the early discovery that that particular sort of rock was just right to use for millstones—"grindstones," as we often call them—our big, black, bustling Sheffield would not lie there behind us in the valley.

So make a place in your mind for *millstone grit*, of which these rocks are made, which delight us as we clamber over them, and which also supply us with the grindstones so necessary to grind the knives and scissors on. And while we are talking of knives and scissors and Sheffield trade, let us ask another question (this one you can easily answer, though you could not tell me how the grit was made, nor who put the "cap" of it on the top of the hill), what makes Sheffield black and dirty? "Smoke" you say. And what makes the smoke? "The coal that is burnt in the great furnaces where iron and steel are being made." Good. And

you know about the coal already, for as we have sat by our blazing winter fires, we have often told each other the wonderful fairy tale of the big forests of long ago, and the marvellous way in which they sank down into the shallow water, and how the ground sank down and down, and the water got deeper and deeper, and more and more layers of stuff settled on top of the big trees, till at last the big forest was changed into coal, and the sunshine that it stored up ages and ages ago, now comes out bright and beautiful as flame, which we delight to watch and to warm ourselves by. You won't forget that we get plenty of good coal in Sheffield. You have been to the mines, and seen the procession of carts carrying off the glistening black stuff. And you can easily understand that had it not been for the coalfields all around us, the steel and iron could not have been melted and made into knives and scissors, and so the millstone grit would not have been of any use to make grindstones of. But there is just one more sort of rock which I want to introduce you to, in order to add to your interest as we wander about the lovely Derbyshire dales.

There are some of the hills, which instead of having the sharp "edge" at the top—like those we first talked of—have the cliff at the bottom, and a gentle, swelling, curved outline above. We saw some in Middleton Dale last summer, you will remember. And we noticed how the rock was whiter than our familiar grit, and finer in composition, and also we were delighted to find many fossils lying on every hand under the walls, and stone heaps, and quarries. And you remember the lime-kilns we saw, where the rock was burnt, and lime was got from it. That will help you also to recall the third sort of rock that greets us in our own immediate neighbourhood—*limestone*, it is called.

You have already learnt something of how the coal was made. Are you not curious to have some notion how the limestone and the millstone grit came to be? Look at those little fossils from the limestone district. Wise men, who have studied them, tell us they are all remains of animals that lived in the sea—and in a deep sea, too. You remember that we learnt that the coal forests sank down and down, and the water grew deeper and deeper around them and over them. In those days the soft mud at the bottom of that sea was laid down, and the little shells and bits of the animals as they died, sank into it, and that was how limestone was made. Do you say "No, that was only soft mud; how did it get changed into hard stone?" Ah! if only we knew all about that change, we should know one of the most marvellous and fascinating of tales. I can only just suggest to you to-day, that your own knowledge of the clay you use for modelling, will help you to some good guesses. You squeeze, and press the clay, and your hot hands dry it, and harden it, and if you want it still harder, you put it in the sun to bake. Heat and pressure harden it. So in some wonderful way, not fully understood by us, that soft limestone mud was hardened and toughened by heat and pressure. And, by-and-bye, as the ground rose again, the mud was lifted right up and up out of the water, till now we see it as hills and great cliffs.

Now, just one word as to the millstone grit. It looks like pebbles and sand, doesn't it? And you may guess as the sea had so much to do with the coal and limestone, that millstone grit also was connected with sea. Not deep sea, but a shallower sea, where little pebbles and sand were laid down by rivers that ran into it. One day we will try and make pictures in our mind as to the order in which these scenes followed each other—the great forest rotting away in the slime—the deep, deep sea with its muddy bottom—and the shallow sea with its sand and pebbles. But this is enough for to-day: coal, limestone, millstone grit, these three are the chief rocks you will see round Sheffield. Later on we will try and answer some more questions as to how they were formed into the present hills and crags. We shall find that water had much to do in that, as well as in first making them.

THE BRITISH MUSEUM FOR CHILDREN.

By Frances Epps.

(*Continued from page* 281.)

BRITAIN—A ROMAN PROVINCE.

You have seen a great searchlight, flashing from tower or ship, suddenly make a dim and distant view as clear as day?

We have, in the Prehistoric Room, been peering back into the dim and distant view of the past. We have had glimpses of shadowy British forms in tartan cloaks, may be, fastened by the ornaments and brooches in the cases; we have admired their necklaces of gold, amber and jet; we have pored over the treasures handled by them in life, buried with them in their barrow-graves; we have imagined their warfare and manner of life, from the weapons and relics that belonged to them. Perhaps we have even heard fragments of the wild stories they learned by heart, and chanted round the firesides of the village, thus handing them down to a far off generation, in the sister island, to commit to writing; we have also caught faint echoes of travellers' tales, from traders and others who came to explore.

But, so dark and still is the distance, in all this we have seen no faces, heard no names—that we are sure about—received no actual message across the years; we have only known that the moving crowds were there in the shadows, and that they, like the treasures they left with Mother Earth, and the words that we have from their lips, in the names of river and hill, belong to the soil. Suddenly comes the light, for what a change there is, in our point of view, when the Romans come upon the scene and gain a footing in the land! We immediately make acquaintance with distinct persons, whose faces and names become as familiar to us as those of our near neighbours; they speak to us too, straight from tablets and monuments, even from books, in a language taught in our schools, and whose words, in great number, are crystallised, as it were, in our daily speech.

So long as our island remained a province of the great empire—nearly four hundred years—the searchlight thrown